

PATENT SPECIFICATION

NO DRAWINGS

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COMPLETE SPECIFICATION

Synthetic Rubber, Windscreen and the like Mounting Strip

We, UNIROYAL LIMITED (formerly The North British Rubber Company Limited), a British Company, of Castle Mills, Edinburgh 3, Scotland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to sealing strips for use in the mounting of windscreens and the like, for example side windows and rear windows, in vehicles, and to vehicles with windscreens and the like so mounted thereon. It is particularly concerned with strips of rubbery material which provide a resilient seal between the glass panel and the frame carrying it.

Difficulty has been experienced in the past with such sealing strips whether based on natural rubber or on Buna S type rubbers ("Buna" is a Registered Trade Mark). This arose from the poor resistance of these materials to exposure to outdoor weather conditions, resulting in cracking. In many cases this necessitated modification to the design of the strip to ensure that the strip is subjected to a minimum amount of residual strain. One example of this has been the production of sealing rubber strips with integral moulded corners so that the radially outer parts of the strip, after positioning, were not under tension. Butyl rubber has been tried because of its good resistance to exposure cracking, but unfortunately it has poor sealing qualities because of its low resilience. Alternative materials having both good sealing and good exposure resistance properties are available, but these, as is the case with for example neoprene, are unduly costly.

It has now been discovered that ethylene propylene terpolymers as hereinafter defined

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have the desirable combination of good resistance to weathering and good sealing properties, and they can be produced at a cost considerably lower than that of alternative materials which are otherwise satisfactory such as neoprene.

The expression "ethylene propylene terpolymer" means a copolymer of ethylene, propylene and a small proportion of a diene which gives rise in the copolymer to side chain double bonds enabling the copolymer to be cured in much the same way as natural rubber. Like some other synthetic rubbers, these terpolymers may either be manufactured to have a moderate molecular weight and used as such, or they may be manufactured to have a considerably higher molecular weight and extended with oil to give a so-called oil extended rubber. The proportion of diene—which will be a non-conjugated diene to provide that the unsaturation is in the side chain—will not exceed about 10% by weight although inevitably the proportion depends to some extent upon the molecular weight of the diene. In the case of dicyclopentadiene, 5% by weight is suitable.

In accordance with this invention, sealing strips are made from the vulcanised product of a compounded ethylene propylene terpolymer rubber, having up to 10% by weight (based on total monomer) of a non-conjugated diene.

The expression "compounded" is used here in its normal sense as employed in the rubber industry, the appropriate compounding agents being reinforcing filler, diluent filler, and vulcanising ingredients. Some hydrocarbon oil will also normally be included. In the case of a terpolymer which is not already oil extended, a typical general formulation will be:

		Parts by weight
	Terpolymer	100
	Hydrocarbon oil	10—150
	Reinforcing filler (Carbon black)	50—250
5	Diluent filler (e.g. Whiting, China Clay)	0—200
	Vulcanising ingredients	Normal proportions as for rubber vulcanisation.

In the case of an already extended terpolymer the proportions may be:

		Parts by weight
10	Oil extended terpolymer	100
	Hydrocarbon oil	0—50
	Reinforcing filler	25—125
	Diluent filler	0—100
	Vulcanising ingredients	As required

- 15 In the case of the oil extended terpolymer, the proportions of terpolymer and extended oil will normally be of the same order of magnitude so that the general formulation just quoted corresponds essentially to the formulation for the non-oil extended terpolymer but with an appropriate amount of the hydrocarbon oil incorporated into the terpolymer during its manufacture.
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- 25 Sealing rubber strips manufactured in accordance with the invention have been tested and have shown no cracking after weathering outdoors in a knotted condition for more than six months whilst similar strips based on a blend of natural rubber and styrene-butadiene copolymer rubber cracked in less than one month. Similarly, on exposure in a strained condition to ozone at 50 p.p.m. the sealing strips according to the invention showed no cracking after 250 hours whereas strips made of the blend referred to cracked within 30 hours.
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- 40 polymer, of approximately equal parts of ethylene and propylene together with 5% by weight on the total of dicyclopentadiene are compounded with 30 parts of hydrocarbon oil, 100 parts of carbon black together with vulcanisation ingredients consisting of paraffin wax, zinc oxide, tetramethyl thiuram mono sulphide, mercaptobenz thiazole and sulphur. The terpolymer has a broad molecular weight distribution and an intrinsic viscosity of 1.9—2.9.
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WHAT WE CLAIM IS:—

- 1) a sealing strip for use in mounting of windscreens, and the like in vehicles, the strip being made from the vulcanised product of a compounded ethylene propylene terpolymer rubber having up to 10% by weight (based on total monomers) of a non-conjugated diene.
- 2) A sealing strip according to claim 1 in which the terpolymer is one which is not initially oil extended and the compounded terpolymer has the formulation:

60		Parts by weight
	Terpolymer	100
	Hydrocarbon oil	10—150
	Reinforcing filler (Carbon black)	50—250
	Diluent filler (e.g. Whiting, China Clay)	0—200
65	Vulcanising ingredients	Normal proportions as for rubber vulcanisation.

- 3) A sealing strip according to claim 1 wherein the terpolymer used is oil extended and the compounded terpolymer has the formulation:

		Parts by weight
75	Oil extended terpolymer	100
	Hydrocarbon oil	0—50
	Reinforcing filler	25—125
	Diluent filler	0—100
	Vulcanising ingredients	As required

- 4) A vehicle having a windscreen, side window or rear window mounted with a sealing strip according to claim 1, 2, or 3.

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